JUST ADOPTED BY THE SCHOOL BOARD FOR LONDON.
PROF. DARQUÉ'S PUPIL TEACHERS' FRENCH COURSE.
Second Edition. Crown 8vo., 200 pp. Price 2/-

THE PRACTICAL TEACHER

A WEEKLY JOURNAL FOR MASTERS MISTRESSES AND STUDENTS

VOL. XI. No. 16. SATURDAY, MAY 2, 1891. PRICE 1D.

ADOPTED IN TRAINING COLLEGES AND P. T. CENTRE SCHOOLS.
Crown 8vo, Extra Cloth, Price 3s. 6d.

PHYSICAL AND ASTRONOMICAL GEOGRAPHY.

Specially designed for Pupil Teachers and Scholarship and Certificate Candidates.

By R. A. GREGORY,

Honours Medallist in Physiography; Solar Physics Committee, the Royal College of Science, South Kensington; Fellow of the Royal Astronomical Society; Foreign Correspondent of the 'Revue Generale des Sciences.'

WITH ORIGINAL ILLUSTRATIONS.

OPINIONS.

One of the best known Educationists of the day writes:—'Mr. Gregory's manual is simply magnificent.'

CHAS. W. REECE, Esq., Lecturer on Geography, Pupil-Teachers' School, Thomas Street, London, E., writes:—'I have no hesitation in saying that the book is a splendid one. Mr. Gregory should be proud of it. I shall certainly recommend it. It ought to be not only in the hands of those for whom it is especially written, but also of every teacher of geography. The illustrations, type, and style of publication will be appreciated by all.'

J. FARISH, Esq., Head Master Pupil-Teachers' School, Manchester, writes:—'I have no hesitation in saying that it will prove to be admirably suited for those for whom it has been specially designed. It has my hearty commendation.'

The University Correspondent says:—'This manual begins with some luminous explanations of various lineal, angular, and superficial measurements used in physiography, and ends with a short classification of the races of mankind. The treatment is throughout full and lucid; the matter good and well chosen; the numerous original drawings are highly instructive (*e.g.*, those illustrating the causes of air-currents on pp. 154, 156); the printing is clear; the binding, and execution of the cuts, leave nothing to be desired; and at the end of most of the eighteen chapters into which the book is divided there is added a useful summary of the contents of the chapter.'

The Journal of Education says:—'Consists of eighteen compactly written chapters on those essential facts that should be well in the possession of every elementary teacher of geography. Each chapter ends with a summary of its contents, and sets of examination papers for pupil teachers, for Queen's Scholarships, and for Certificates, are given at the end of the book. **Much pains has been taken to give thorough explanations of difficult phenomena, and the numerous diagrams and pictures are well chosen and apt. The information given is usually well up to date.'**

The Royal College of Science Magazine, says:—'Astronomical and Physical phenomena are dealt with in such a comprehensive, simple, and accurate manner, as must at once recommend it to pupil-teachers and scholarship students, for whom it is primarily intended. Teachers of Elementary, and even Advanced Physiography, would do well to adopt it as a text-book; while our own students would find the Astronomical portions particularly helpful at the end of their first year. The style is lucid, and easy for Elementary students to understand; the numerous illustrations and diagrams are excellent. A recapitulation at the end of each chapter will be found very useful for examination work.'

Nature says:—'The general conception and arrangement of this volume are very good, and the same may be said of the detailed treatment of most of the subjects discussed.' The chapter on the rotation of the Earth and consequent phenomena is exceedingly good, as is the following one on its revolution.

The account of eclipses and of the tides is also good, and well calculated to render these phenomena intelligible to learners. The chapters on the atmosphere and its movements are also clear and instructive, as are those on oceans and ocean currents. The numerous illustrations are clear, and elucidate some of the more difficult problems discussed.'

London: JOSEPH HUGHES & CO., Pilgrim Street, Ludgate Hill, E.C.

☛ SEE ALSO PAGES 254 & 255.

LONG TOTS FOR STANDARDS IV., V., VI., AND VII.

NOTE.—*Ten minutes should be allowed for each set.*

No. 1.

	£	s.	d.		£	s.	d.
1.	795,646	19	5	2.	858,940	19	11
	834,195	17	11		796,534	17	10
	451,279	15	9		59,625	13	8
	98,455	12	8		634,329	15	9
	838,714	18	7		438,245	16	7
	647,534	13	4		593,906	12	5
	90,989	14	2		761,915	18	6
	707,818	16	10		476,124	19	8
	736,585	19	9		333,949	9	3
	423,817	8	4		174,346	13	4
3.	546,928	18	8	4.	759,456	15	9
	639,716	15	11		84,515	18	11
	98,637	14	9		837,476	19	8
	435,126	17	7		609,956	14	6
	781,834	19	8		348,737	13	7
	919,049	13	10		738,639	11	4
	376,933	12	5		299,263	9	8
	459,147	14	6		546,949	18	5
	754,467	16	3		737,733	19	9
	169,962	19	4		456,957	16	10

No. 2.

	£	s.	d.		£	s.	d.
1.	798,420	19	9	2.	537,210	19	11
	84,767	18	10		928,176	15	9
	564,387	16	8		76,534	17	8
	783,465	17	7		438,192	14	10
	98,709	12	6		742,931	18	2
	834,216	15	9		373,904	16	7
	169,384	14	11		630,715	12	9
	653,244	19	7		512,763	19	5
	79,693	17	8		483,287	17	4
	889,191	8	5		87,955	13	9
3.	337,438	18	9	4.	747,839	14	3
	423,874	19	11		318,743	19	8
	92,675	15	10		89,614	18	4
	848,090	14	7		285,773	9	10
	637,934	19	4		843,251	17	6
	273,645	13	8		592,745	15	8
	89,704	8	9		731,849	16	5
	935,618	17	5		90,958	14	2
	77,509	16	6		634,593	15	9
	594,303	19	9		91,186	12	7

No. 3.

	£	s.	d.		£	s.	d.
1.	412,638	18	6	2.	124,675	12	6
	836,715	16	8		542,371	16	8
	575,484	17	6		824,737	18	9
	321,149	13	4		842,375	19	5
	763,485	14	3		123,456	15	7
	872,798	12	9		654,321	15	9
	212,076	19	10		827,375	18	11
	543,587	10	9		484,373	11	8
	313,484	18	11		248,735	17	6
	276,763	12	6		124,659	9	10
3.	241,763	13	4	4.	216,763	9	11
	376,485	16	8		376,612	17	6
	587,693	14	6		840,261	13	4
	842,739	12	8		284,635	14	3
	248,397	18	11		578,284	12	6
	112,214	10	9		487,428	16	8
	763,379	19	10		231,402	13	4
	936,843	12	6		831,689	17	6
	369,348	16	2		425,987	18	9
	127,575	11	9		314,778	19	11

No. 4.

	£	s.	d.		£	s.	d.
1.	214,863	16	8	2.	348,742	14	6
	487,936	12	4		487,693	16	8
	695,467	14	6		898,765	13	4
	541,078	13	4		785,479	16	11
	632,375	18	11		857,693	14	5
	537,786	14	5		375,846	17	9
	673,654	17	6		484,589	19	7
	235,736	19	10		763,845	12	10
	482,375	16	7		420,632	10	2
	289,763	12	4		145,917	14	6
3.	249,853	18	9	4.	432,856	14	8
	194,358	17	6		321,865	18	6
	276,375	13	4		520,196	17	11
	482,796	16	8		185,376	15	8
	965,432	15	7		654,735	17	9
	846,791	17	5		428,573	14	11
	185,437	19	10		149,762	7	6
	742,652	14	8		762,489	12	8
	813,735	12	11		627,984	18	10
	425,672	16	9		428,642	16	8

No. 5.

	£	s.	d.		£	s.	d.
1.	148,635	16	8	2.	216,483	14	9
	823,569	14	6		842,768	19	6
	435,763	13	7		328,475	16	4
	852,548	15	9		842,754	19	11
	68,734	19	5		245,758	11	8
	786,437	17	4		427,389	18	10
	235,375	14	11		763,423	14	6
	484,539	11	8		321,076	13	4
	420,385	16	4		138,764	16	8
	248,763	13	10		283,467	18	9
3.	647,563	17	9	4.	384,642	14	6
	123,678	19	8		428,246	17	8
	247,574	18	6		639,763	18	9
	835,763	15	7		842,389	19	11
	375,849	17	11		231,960	14	5
	763,484	11	9		414,375	15	7
	132,678	19	5		547,315	17	11
	541,876	15	10		284,736	14	6
	895,463	14	6		643,867	9	10
	384,536	13	4		368,795	18	9

No. 6.

	£	s.	d.		£	s.	d.
1.	231,487	16	8	2.	231,428	14	6
	842,753	18	4		638,247	16	8
	387,765	14	11		565,472	14	9
	435,578	12	9		639,249	19	4
	863,489	19	8		543,231	12	10
	736,584	18	10		91,468	10	8
	457,458	10	7		635,486	18	6
	659,763	17	4		364,865	13	4
	367,578	14	6		178,586	15	7
	468,765	16	4		187,658	17	5
3.	134,678	18	6	4.	341,825	16	8
	684,375	16	8		148,352	18	6
	539,684	12	11		98,763	12	9
	467,548	16	1		234,840	11	10
	384,679	18	9		483,437	10	9
	842,137	19	7		538,734	19	6
	624,735	17	5		135,548	16	8
	548,357	15	6		374,289	13	4
	876,589	16	8		987,825	14	7
	375,484	13	4		796,582	17	5

No. 7.

	£	s.	d.		£	s.	d.
1.	248,376	14	4	2.	234,876	14	9
	842,763	16	8		643,768	19	4
	287,536	12	9		834,687	17	11
	145,378	13	11		289,763	11	9
	254,879	9	5		427,584	18	10
	763,425	19	7		328,763	16	8
	842,375	18	3		842,376	13	4
	427,549	15	10		289,763	14	7
	863,348	16	4		928,376	16	5
	735,423	12	8		842,385	15	6
3.	243,869	16	4	4.	342,835	16	8
	765,247	14	11		876,387	18	6
	384,472	15	9		763,453	17	9
	863,385	19	8		841,076	17	5
	245,853	16	4		538,769	18	9
	287,768	14	7		845,678	19	7
	425,879	17	5		576,859	16	8
	763,428	12	8		684,598	18	6
	548,842	16	9		123,985	13	4
	685,763	19	6		247,686	15	7

A Course of Object-Lessons and Elementary Science.

(Adapted to the Syllabus of the New Code and of the London School Board.)

BY RICHARD BALCHIN,

Head Master under the School Board for London.

We now come to the highest class of vertebrate animals. Here it would be well to recapitulate what was said in the last lesson as to what is meant by such a class being 'high' and another 'low.' Of course, third standard boys cannot grasp all that is involved in these expressions. They will, however, very readily understand that a heart with only one chamber, like that of the lowest fish, which simply receives and forces onwards the same fluid, is a less perfect organ than a double heart with its four chambers, and its wonderfully complete system of circulation; just as a good church organ, with its ten or twelve sets of pipes, producing all the most varied and beautiful effects, is a more perfect instrument, and of a far higher type, than a harmonium with only one set of reeds.

Vertebrate Animals—Mammals.

9. Have ready pictures of the various members of this class. Also the chart of human physiology; and if possible the heart of an ox.

Talk about the pictures; what a number of animals there are in this class! Tell the boys you will write on the black-board the names of some of the most important, and that you will place them one above the other like a ladder, the lowest member of the class shall be at the bottom and the highest at the top. Recapitulate what is meant by 'lowest' and 'highest.' Then write out this list:—man, gorilla, bat, rabbit, lion, seal, elephant, cow, horse, whale, dolphin, kangaroo, duck-mole (ornithorhynchus). Carry on a conversation about this list, and refer to the pictures. Some of the boys, forgetting what has been said in previous lessons, or most probably being absent when it *was* said, will object to the whale and dolphin being in the list, and will consider them fish. Correct this. Refer to what was said about all the members of the classes up to the one we are now taking, with respect to their birth from an egg. Some boys keep fowls or canaries, and know well enough that the young is hatched from an egg. Some boys keep rabbits: ask if they go to the rabbit-hutch every morning to see whether they have laid any eggs. So lead to the distinguishing character of the mammals, and explain the term. Describe the heart and its four chambers. Trace the passage of the blood through it. Refer to the difference (which has been already noticed) between the lungs of a mammal and those of a bird.

This lesson concludes our short course upon the subject of the 'Classification of Vertebrate Animals.' We now proceed to group the sub-kingdom—'Flowering Plants.' I need scarcely say that I would, as far as possible, avoid technical terms which involve considerations far beyond the grasp of third standard boys. Such, for instance, as the words phanerogamia and cryptogamia, gynæcium and andræcium, gymnosperm and angiosperm. For the present, make use of the terms 'endogen' and 'exogen' for the flowering plants; and explain that acrogen (ferns, palms, &c.) and thallogen (sea-weed, fungus, &c.) refer to the flowerless plants. Before, however, touching upon the details of a classification, it will be necessary to have one lesson upon the general question, and decide upon our basis of classification; just as we did in the case of the division into groups of the vertebrata.

Flowering Plants:—Classification.

10. Have ready pictures of trees, or of plants, and as many specimens as the boys can procure for the lesson. Also pictures or specimens of various grasses, and different kinds of corn. Carry on a conversation about all these plants. It will soon be discovered that the boys do not consider 'grasses' as flowering plants. Explain when the flowers or blossoms of grasses appear. Get the boys to suggest some classification. I find that the boys usually propose a dual grouping; such as—trees and plants, or trees and bushes, or trees and shrubs. It is generally considered that 'trees' should form a class. Point out the defects of this method. Is the currant a tree or a bush; and what shall we say of the sugar cane, or the raspberry cane, as it is called. Refer to the lesson upon the general classification of vertebrate animals. What was our basis? Their general appearance? Or habits? No; but the structure of the chief organs. And we will do the same with flowering plants. But the boys will remember, we had two or three lessons upon the organism of vertebrate animals before proceeding to make our division into classes. We must do the same with flowering plants. Some boys, however, will demur to the statement that plants *have* any organs. What *is* an organ? It is some distinct part of a living creature, which performs some definite work or function. Make this clear. The heart is an organ. Its function is the circulation of the blood. The skin is an organ. Its function is to throw off certain impurities from the body. The lungs are organs, so are the eyes, the brain, &c. Now, has a plant any distinct parts which can be said to have proper and definite functions? Get from the boys what they think about this. Here is a geranium in a pot upon the table. Can the boys name any particular parts of it? A string of questions in this direction will lead the boys to see that flowering plants have these parts: root, stem, leaves, and blossoms. Tell the lads, these parts are really organs; and in the next two lessons we will talk about them, and try and find out what special work they each perform.

Flowering Plants.—Root, Stem, Leaves.

11. Have ready pictures of plants showing the parts we are about to describe. Bougard's diagrams are suitable; also some specimens which the boys will willingly bring for the lesson. Hold up a specimen, or refer to the pictures. Point to the root; ask what this is? What do the boys suppose is its use? Talk about it, and get as many different answers as possible. The following facts will soon be forthcoming from the class:—A cutting from a plant (example, a geranium) will not begin to grow until it has a root. Some boy had a plant which died, and when he pulled it up, it was seen that the root had been eaten away by a grub. Plants that have roots, yet die if the ground is allowed to remain quite dry. A tree in the

street by the roadside died; some men afterwards found there had been an escape from the gas-main, and the ground at the root of the tree was blackened: the tree had been poisoned. From these observations it is easy to conclude that the root is an organ of the plant, and one at least of its functions is to obtain sustenance of a proper kind, and in a proper form, from the ground. Pursue an exactly similar course with respect to leaves. Refer to the case of the boy who cut off all the leaves from his strawberry plant with a view of 'driving all the strength' into the fruit. The plant died. Lead to the fact that as the root absorbs mineral food in solution, from the ground, so the leaves, in like manner, receive sustenance from the air. Briefly explain how this is effected. Show a section of an exogenous stem, and also one of an endogenous stem. Point out the difference in structure, and make it plain that these different parts are all so many different organs engaged either in circulating the fluids or sap of the plant—what we may term the blood of the plant—or else in converting portions of these fluids into parts of the solid structure of the plant.

Query Column.

Arithmetic.

1. TEACHER.—Given that 27·7274 cub. in. of water weigh 1 lb. Avoir., and that ice is 9·3 times as heavy as water, find to the nearest inch the edge of a cubical block of ice weighing a ton. (*Donkin and Hodge's 'Arithmetic.'*)

1 lb. of water = 27·7274 cub. in.
" ice = (27·7274 ÷ ·93) cub. in.
1 ton " = (27·7274 × 2240 ÷ ·93) cub. in.
= 27·7274
224
1109096
554548
554548
·93)62109·376(66784·275268
558
630
558
729
651
783
744
397
372
256
186
700
651
490
465
250
186
640
558
820
744
76

∴ Edge = $\sqrt[3]{66784{\cdot}275268}$ + cub. in.

66'784·275'268(40·57
64
$40^3 \times 300 = 480000$ | 2784275
$40 \times 5 \times 30 = 6000$
$5^2 = 25$
486025 | 2430125
$405^2 \times 300 = 49207500$ | 354150268
$405 \times 7 \times 30 = 85050$
$7^2 = 49$
49292599 | 345048103
9102075

∴ Edge = 40·57 + in. Ans.

Algebra.

1. R. FISH.—Show how to express the square root of an imaginary expression of the form $\alpha + \beta\sqrt{-1}$. (*Todhunter.*)

Suppose $\sqrt{\alpha + \beta\sqrt{-1}} = x + y\sqrt{-1}$,

Squaring] $\alpha + \beta\sqrt{-1} = (x + y\sqrt{-1})^2$
$= x^2 - y^2 + 2xy\sqrt{-1}$

Hence $\left.\begin{aligned} x^2 - y^2 &= \alpha \\ 2xy\sqrt{-1} &= \beta\sqrt{-1} \end{aligned}\right\}$

$\left.\begin{aligned} x^2 - y^2 &= \alpha \\ 2xy &= \beta \end{aligned}\right\}$

Squaring each of these $\left\{\begin{aligned} x^4 - 2x^2y^2 + y^4 &= \alpha^2 \\ 4x^2y^2 &= \beta^2 \end{aligned}\right\}$

$x^4 + 2x^2y^2 + y^4 = \alpha^2 + \beta^2$
$(x^2 + y^2)^2 = \alpha^2 + \beta^2$
$\therefore x^2 + y^2 = \sqrt{\alpha^2 + \beta^2}$.

$\left.\begin{aligned} x^2 + y^2 &= \sqrt{\alpha^2 + \beta^2} \\ x^2 - y^2 &= \alpha \end{aligned}\right\}$

$2x^2 = \sqrt{\alpha^2 + \beta^2} + \alpha$
$2y^2 = \sqrt{\alpha^2 + \beta^2} - \alpha$
$x^2 = \frac{1}{2}\left\{\sqrt{\alpha^2 + \beta^2} + \alpha\right\}$
$y^2 = \frac{1}{2}\left\{\sqrt{\alpha^2 + \beta^2} - \alpha\right\}$

$\therefore x = \pm\left\{\frac{\sqrt{\alpha^2 + \beta^2} + \alpha}{2}\right\}^{\frac{1}{2}}$

$y = \pm\left\{\frac{\sqrt{\alpha^2 + \beta^2} - \alpha}{2}\right\}^{\frac{1}{2}}$

We may obtain the square roots of $\pm\sqrt{-1}$ by supposing $\alpha = 0$ and $\beta = \pm 1$ in the above results.

Thus $\alpha + \beta\sqrt{-1}$
$= 0 + (\pm\sqrt{-1}$
$= \pm\sqrt{-1}$.

Substituting values from above results we obtain

$$\sqrt{+\sqrt{-1}} = \pm\left\{\frac{\sqrt{0^2 + 1^2} + 0}{2}\right\}^{\frac{1}{2}} \pm \left\{\frac{\sqrt{0^2 + 1^2} - 0}{2}\right\}^{\frac{1}{2}}\sqrt{-1}$$

$$= \pm(\tfrac{1}{2})^{\frac{1}{2}} \pm (\tfrac{1}{2})^{\frac{1}{2}}\sqrt{-1}$$

$$= \pm\frac{1}{\sqrt{2}} \pm \frac{\sqrt{-1}}{\sqrt{2}}$$

$$= \pm\frac{1 + \sqrt{-1}}{\sqrt{2}};$$

Similarly $\sqrt{-\sqrt{-1}} = \pm\dfrac{1 - \sqrt{-1}}{2}$,

Publications Received.

MACMILLAN AND CO.—The Progressive Euclid, Books I. and II. (*Richardson*); Heat, Light and Sound (*Jones*).

NOTES OF A LESSON ON 'CARRYING THE BABIES.'

BY MRS. W. H. WIGLEY,

Teacher of Method at the Cheltenham Training College for Mistresses.

Girls (Infants). Ages, 5—6. Time, thirty minutes.

Teacher to provide herself with a baby-like doll, a small shawl, a piece of flat braid a little longer and broader than the doll, with a hook inserted at one end, and a yard or two of broad calico or lining strip to serve as a bandage.

Also to provide a picture of a kangaroo with the little ones in the pouch, and another of an opossum with the young on its back holding on by their tails curled round the mother's.

HEADS.	MATTER AND METHOD.	B. B. SUMMARY AND ILLUSTRATIONS.
	Introduce the lesson by asking who have babies at home, and leading the children to say what they have to do for them.	
I.—Babies must be carried— (*a*) Why? (*b*) How?	Why must we nurse babies? Why cannot they go from place to place as we do? If we tried to make them go what would happen? Why would they fall? Show that babies' bones are soft; they are not firm enough to bear their weight. Lead them to see what happens if tender things have to bear weight—they break or bend. Remind them of little legs bent by being put to walk too soon. What sort of bones has baby? How do you want them to grow?	
II.—Ways we carry babies— (*a*) Babies are held in the arms.	Teacher to introduce the doll. Now see, here is a doll like a baby. If I wanted to keep its back straight how must I hold it? If I set it up I must put my hand so, lest its back should bend. I must not hang it over my shoulder or run very quickly while I hold it lest I should shake it and hurt its tender little bones. When my arms are tired where must I put baby?	Teacher to illustrate the way 'not to do it.'
	Now none of you are very old little nurses. Why does your mother want you to hold baby? '*Because she is so busy.*' Yes, she has so much to do—dinner to cook, and house to clean—and she cannot spare her arms for baby all the time; so she is glad when her little girl can help her hold baby.	
(*b*) Babies are carried on the back.	But some mothers have babies and a good deal of work for both arms, and no little girl to help. What can they do? To-day a woman came to my door to sell things. She had a large basket of tins and brushes, which took both her hands, and a good fat baby to carry. How did she manage? No, she could not find room for him in the basket, it was too full. I will show you what she did.	
	Teacher to call out one child and tie two of the ends of the shawl round her waist and two round her shoulders, gipsy fashion. Then to place the doll in the shawl, and give the child a basket to hold.	Show the use of the shawl by gipsies, etc.
	Now who has seen a baby carried like that? When are babies carried on the back? How does mother feel when she has carried baby in her arms a long time? What does she call him? Why does she call him 'a load'? How many loads has she when she puts him on her back? How must she feel then?	
(*c*) Babies are carried on a board.	But in some places the poor women work very hard indeed. The Indians make the women do all the hard work. The men are always journeying about, and the poor wife has to carry all the luggage—the tent they live in, and all the other things. Her arms are full and her back is loaded; where can she put her baby? They have to make baby safe somehow; and this is how they manage.	Show the children how Indian babies are managed.
	The teacher to lay the doll on the board, and lightly bandage it from the arms downwards; then to show how the baby can be placed in a basket, or leant against a wall, or hung up in a tree.	
	Now tell me how many ways babies can be carried. 'In the arms,' 'On the back,' 'On a board.'	
III.—Ways animals carry their babies.	But there are other babies besides ours. What are pussy's babies called? How does she carry them? What are the dog's babies called? How are they carried? Yes, the cat and the dog carry their babies in their mouths.	
(*a*) In the mouth.	Now look at this picture. Who can tell what animal this is? It has a funny name. We will say it altogether, and we will put it on the board. It is called a kan-ga-roo. Say it again—spell it; you say it—now you—now we will say it once more. Now tell me where the kangaroo has put her babies. Yes, she has a pouch in front—a pocket in her coat, like father has a pocket in his coat. Remind the children of the lap bags to keep needle-work in. Show the children that the baby kangaroos leap into their hiding-place directly they are afraid or tired. Tell them that this hiding-place is called a pouch. Let them repeat, 'Some animals carry their babies in a pouch.'	Show the picture of the kangaroo. Write the word on Black-board.
(*b*) In a pouch.		
(*c*) On their backs.	Now here is another picture. Look at it well. Here is a dark little animal about as big a rat. Who has seen a rat? Tell me where its babies are. When the mother with the basket put her baby on her back, how did she keep it there? Look at this picture, and tell me why these babies do not fall off. What are they doing with their feet? How is the mother holding her tail? Why is she doing this? What does this help the little ones to do? This little animal is called an 'opossum'. Teacher to describe it—to write the word on blackboard. To repeat it over and over, and have it repeated until the children remember it. What animal carries her babies on her back? in a pouch? in her mouth? How do we carry our babies? Where does the gipsy carry them? How do the Indian women manage? Why must babies be carried? How must they be carried? etc.	Show the picture of opossum. Write 'Opossum.'

The 1891 Scholarship Examination.

BY DR. GEORGE BEACH, M.A.

Co-Author of 'A Manual of our Mother-Tongue,' Author of 'Elements of English,' 'Entertaining Readers.'

HOW TO STUDY ENGLISH—(*continued.*)

ENGLISH comprises, for the Scholarship Examination, Composition, ordinary Etymology and Syntax, Parsing, Analysis, Paraphrasing, Teutonic, Greek, and Latin Prefixes, Affixes and Roots, the outlines of the History of the Language and its Literature, and Recitation.

It must also be borne in mind that a knowledge of 'how to teach' these divisions of English is also required.

For the COMPOSITION exercise, a short essay of about fifteen lines is always requested, and a choice of three subjects is generally afforded.

The following are examples of the propounded themes :—

1886.	1887.
(*a*) Truthfulness, in act and in word.	(*a*) A ship on fire.
(*b*) Poetry.	(*b*) Closer union with our Colonies.
(*c*) The Queen rules over an Empire upon which the sun never sets.	(*c*) A walk round a garden.
1888.	**1889.**
(*a*) Good manners.	(*a*) Any memorable place, city, castle, or battle-field which you may have visited.
(*b*) The importance of the telegraph and telephone from a commercial point of view.	(*b*) The use of pictures in teaching.
(*c*) The advantages of a school library for the children.	(*c*) Colonisation.

1890.

(*a*) Some uses of the electric telegraph.
(*b*) A court of justice.
(*c*) Emigration.

The above subjects will afford, together with those set in our question column, a quite sufficient number for practice from now until July.

The candidate should endeavour not to be too prolix or high-flown, not to indulge in unnecessary adverbs and adjectives, not to use general words instead of particular (such as the words *do*, *make*, *thing*) and not to construct the sentences in too involved a fashion.

He should remember, too, that inferior Composition will deteriorate any answer of Geography, Grammar, etc. Slip-shod English is very common, and multitudinous candidates attempt to make sentences without verbs!

When any question whatever (not of a mathematical nature) has to be answered, it should be first well considered whether it lend itself to the tabular answer or a literary one. If the former kind be not advisable, then the Composition of the latter should equal in polish and accuracy of structure the more formal essay of the English Paper.

We do not here pretend to give rules for elegant writing, but would refer the student to Mr. Dawson's Essay-Writing and Paraphrasing for practical and scientific guidance. Of course it is absolutely essential to be fairly well acquainted with the best of our standard authors, but as a rule it is wise to eschew the newspaper style.

Verse-making, wherein strict attention has been paid to rhyme, rhythm, and suitability of epithets, is a great means of improving, especially if the rhymester will conclude by consigning his productions to the all-devouring and non-disclosing flame.

In ETYMOLOGY AND ACCIDENCE the chief points to be studied are—accuracy of definition and classification, the uses of inflections, auxiliaries and particles, idiomatic uses of Prepositions, the employment of one word as more than one part of speech.

A thorough knowledge of the irregular verbs is essential.

WEEK COMMENCING 4TH MAY, 1891.

DAYS.	FIRST HOUR.	SECOND HOUR.	THIRD HOUR.
M.	Algebraic Fractions *or* Rules for Health.	History from 1745 A.D. to 1763 A.D.	Latin *or* French.
TU.	Euclid Book I. *or* Paper Diagram of Chemise.	Geography of British North America.	Science.
W.	Interest, Discount and Percentages.	Drawing.	English (see Article) and Accidence in Text Book.
TH.	Fractional Simple Equations *or* Clothing and Washing.	Dates from 1715 A.D to 1763 A.D.	Latin *or* French.
F.	Deductions on Euclid Book I., *or* Sectional Paper Diagram of Night Shirt.	Geography of New Zealand and Tasmania.	Science.
S.	Stocks.	Revise History of Norman Period.	How to teach Arithmetic.	Latin Affixes " Prefixes

REMARKS ON ROUTINE.

(*a*) When the work for men and women is different the lower half of the rectangle is respectfully dedicated to the latter.

(*b*) Six copies each of large and small hand should now be written per week.

(*c*) The services of a friend should be utilised to give out the Dictation.

(*d*) ALGEBRAIC FRACTIONS.

Hamblin Smith, pp. 77 to 88, Examples XL. to XLIII., sums 8 and 9 in each.

Charles Smith, p. 143, Example XLI., sums 14 to 21.

Todhunter, p. 87, sums 8, 9, and 14; and p. 93, sums 36, 37, and 38.

FRACTIONAL SIMPLE EQUATIONS.

Hamblin Smith, p. 107, sums 25, 26, 27; and p. 109, sums 16, 17, and 18.

Charles Smith, p. 149, sums 19 to 24.

Todhunter, p. 109, sums 17 to 22.

(*e*) EUCLID.

Deighton.—(1) to p. 82; (2) Deductions on p. 83.

Todhunter.—(1) to p. 52; (2) Deductions on p. 350.

(*f*) ARITHMETIC.

Men, Pendlebury.—p. 204, sums 17 and 18; p. 225, sums 18 and 19; p. 228, sums 41 and 42; p. 233, sums 5 and 6.

Women, Dixon and Beach.—(1) p. 161, sums 11 and 15; p. 172, sums 8 and 9; p. 177, sums 30 and 31. (2) p 191, any 6 sums not previously worked.

(*g*) HISTORY.

Sanderson, pp. 309 to 317 (*Scotch Code*). Tudor Dynasty in addition.

Ross, pp. 359 to 376.

Curtis, Incidents of following dates, 1716, 1718, 1720, 1727, 1730, 1739, 1743, 1745, 1746, 1748, 1752, 1756, 1757, 1759, 1760, 1762, 1763.

(*h*) GEOGRAPHY.
Anderson.—(1) pp. 168 to 175; (2) pp. 204 to 207.
Moffatt.—(1) pp. 176 to 183; (2) pp. 196 to 201 (*Scotch Code*). Outlines of Political Geography of Asia.

(*i*) ENGLISH.
(1) Revise Definitions, Inflections, and tables of the Parts of Speech.
(2) *Beach's 'Elements of English.'* Revise pp. 181, 182, 183, 184, 198, 199, 200.

(*j*) LATIN.
Read Mr. Huxley's Article and Chapters 43 to 47, of '*De Bello Gallico.*'

FRENCH.
Master pp. 114 to 150, and pp. 56 to 65 of '*La Jeune Sibérienne.*'

(*k*) CLOTHING AND WASHING.
Hughes's Domestic Economy, pp. 206 to 210, 377 to 388, and 389 to 409.

1. Solve the following equations :—

(*a*) $\left.\begin{aligned}\frac{3x+1}{7}-\frac{2x-y}{2}&=\frac{2y-x}{8}\\ \frac{4x-2}{3}-\frac{4y-5x}{2}&=\frac{x+y}{5}\end{aligned}\right\}$ Ans. $x=2$; $y=3$.

(*b*) $\frac{1}{9-2x}+\frac{4}{5}=\frac{1}{3-x}$. Ans. $4\frac{1}{2}$.

2. (*a*) Prove the rule for dividing one fraction by another.
(*b*) A grocer bought 2 cwt. of sugar at £1 5s. per cwt. The sugar having been damaged, he sold part of it at 2d. per lb., and the rest at 2½d., and on the whole transaction lost 12½ per cent. How much did he sell at each price?
Ans. 70 lbs. at 2d., and 154 lbs. at 2½d.

3. Two adjacent sides of a field are at right angles, and their lengths are 78 and 104 yards respectively. The other two sides form with a diagonal an equilateral triangle. Find the area of the field to three places of decimals. Ans. 11373·911 sq. yds.

4. Write down the corresponding Algebraic forms of the Theorems of Euclid, Book II.

5. Define parallel straight lines.
To draw a straight line through a given point parallel to a given straight line.
A is a point without the angle CBD. Draw from A a straight line, AEF, cutting BC in E and BD in F, so that AE may be equal to EF.

6. (*Scotch Code.*) If two straight lines cut one another within a circle, the rectangle contained by the segments of one of them is equal to the rectangle contained by the segments of the other. Through any point in the common chord of two circles which intersect one another, draw two other chords, one in each circle, and show that a circle can be described through their four extremities.

7. (*a*) Prove the rule for the multiplication of fractions.
(*b*) Divide ·78 by 1·3, explaining the work, as to a class of children who are beginning Division of Decimals. Ans. ·6.
(*c*) Define ratio. What number has the same ratio to four as four has to seven?
(*d*) In Mental Arithmetic what rules would you give :—
I. For multiplying by ·75;
II. For finding the value of any number of things at £1 3s. 4d,
III. For finding simple interest on a given principal for a given time at 2½ per cent. per annum, *and*.
IV. For finding the cost for one year at 7d. per day?
Ans. £10 12s. 11d.

8. Find the discount on £160½ due two years hence, at 3½ per cent. simple interest. Ans. £10 10s.

9. The length of each side of a square piece of thin metal is 4 feet, and lines are drawn parallel to each side dividing it into nine equal squares out of each of which the inscribed circle is punched.
If the value of the whole piece of metal be £14, what is the value of the circular discs thus punched out?
Ans. £10 19s. 10·944d.

10. Explain in detail the different ways in which the Post Office gives opportunity for saving money.
Give illustrations of each mode of investing savings.

11. Say how cheese is made, and what kinds of cheese contain the most nourishment.

12. Write a short essay on 'Good Manners.'

13. Paraphrase :—
'Far differently the mute Oneyda took
His calumet of peace and cup of joy;
As monumental bronze unchanged his look;
A soul that pity touched but never shook;
Trained from his tree-rocked cradle to his bier
The fierce extremes of good and ill to brook
Impassive—fearing but the shame of fear—
A Stoic of the woods, a man without a tear.'

14. Briefly describe the Physical features of New Zealand.

15. Name the States of South America, and describe briefly their social, political, and industrial condition.

16. (*Scotch Code.*) What British Possessions would be passed on a voyage to India by the Cape route?

17. What events happened in 1709, 1716, 1743?—and give the dates of Treaties of Aix-la-Chapelle, Paris, Versailles, and Amiens.

18. Write a short life of *one* of the following :—Marlborough, John Wesley, Lord Beaconsfield.

19. (*Scotch Code.*) Tabulate the battles of the Great Rebellion, giving dates and results.

20. Write full notes of a lesson on Rivers *or* (for Infants) on Fruits.

21. What is meant by *good discipline*? What are the means and ways of improving discipline?

22. Write six lines of the Large-hand Copy, '*Hypnotic Somnambulism.*'
" " Small-hand Copy, '*And methought whilst the Liberty sung 'Twas Liberty only to hear.*'

23. Translate into English—

'Elle fit heureusement le trajet jusqu' à l'embouchure de la Khama dans le Volga. Depuis ce lieu, le bateau, remontant le fleuve, était tiré par des chevaux. La voyageuse éprouva dans ce dernier trajet un accident qui lui fit courir les plus grands dangers. Pendant un de ces violents orages qui sont très-fréquents dans ces contrées, les bateliers, voulant éloigner la barque du rivage, poussèrent avec force une grande rame, qui servait de gouvernail, du côté où plusieurs personnes étaient assises sur le bord du bateau, et n'eurent plus le temps de la retirer; trois passagers, au nombre desquels était Prascovie, furent renversés dans le fleuve.'

24. Translate into English :—

In 'castris Helvetiorum tabulæ repertæ sunt litteris Græcis confectæ, et ad Cæsarem relatæ, quibus in tabulis nominatun ratio confecta erat, qui numerus domo exisset eorum, qui arma ferre possent, et item separatim pueri, senesque mulieresque.

Quarum omnium rerum summa erat, capitum Helvetiorum millia ducente sexaginta tria, Tulingorum millia triginta sex, Latobrigorum quattuordecim, Rauracorum viginti tria, Boiorum triginta duo: ex his qui arma ferre possent, ad millia nonaginta duo.

CORRESPONDENCE.

J. K. L. (Barnsley).—(*a*) Population of England in

Date.		Number.	Per cent. of Yrly. increase.
1750	was about	7,250,000	
1800	"	9,000,000	·5 (nearly)
1810	"	10,000,000	1·1
1821	"	12,000,000	1·8
1841	"	16,000,000	1·7
1851	"	18,000,000	1·3
1861	"	20,000,000	1·1
1871	"	22,750,000	1·4
1881	"	26,000,000	1·4
1891	"	29,500,000 (estimated)	1·3

(*b*) Daily surplus of births over deaths in the United Kingdom equals 1500.

SULTAN (Dawley).—(*a*) Most probably, and shortly, but we will preserve your address and write you, if necessary. (*b*) See list on p. 29 of No. 2 of this year's issues. Also Lotze or Sully's 'Psychology' and Jeavon's 'Logic Primer.'

E. J. M, (Gamlingay).—No further letter has reached us.

E. D. (Knutsford), L. U. (Overbury), SMILER (Bristol), answered per letter.

H. M. I. A. (———).—We hope to insert the Mathematical Answers next week.

PUPIL TEACHERS' LATIN COURSE.

BY L. HUXLEY, B.A.,

Classical Master Charterhouse School.

This New Latin Course (specially written for Scholarship Candidates) was begun in our issue of February 7th (No. 4, vol. XI.).

EXERCISE XXVII.

1. At fortūnā impĭgrīs fāvĕt. 2. Agricŏlă ille pauperrĭmus quamquam tantŭlum hābĕbat fundum, stercŏre multō adhĭbĭtō sŏlum effĕcĕrat uberrĭmum. 3. Ităque agrō răphānīs sātō, mīră prōvĕnit sĕgĕs. 4. Inter cētĕrōs praestabat ūnŭs et cōlōrĕ rŭberrĭmō et magnĭtūdĭnĕ înaudĭtă; quem, hūmānō corpŏrĕ et ponderĕ multō majorem, vix trĕs hŏmĭnēs tollĕre pŏtŭĕrunt. 5. Rēgium mūnus esse rătŭs, quiă nēmō ēmĕre vōlĕbat, plaustrō ad rēgem stătim vexit.

Translation.—1. But fortune favours the industrious. 2. That very poor farmer, although he had so small a farm, had made the soil very fertile by applying a great deal of manure (N.). 3. Accordingly, the field being sown with radishes, a wonderful crop came up. 4. Among the rest one took the first place both for its very red colour and for its unheard-of size; three men could hardly lift it (as it was) much more than a man's (lit., human) body and weight (N.). 5. Thinking this a gift for the king (lit., royal gift), because nobody would buy it, he forthwith carried it in a waggon (N.) to the king.

Grammatical Notes.—1. Verbs meaning to favour, please, trust, command (except *jubeo*), and their opposites (envy, displease), take a dative where the English has a direct object. 2. *Tantŭlum*, a diminutive from *tāntus*, 'so great.' The commonest forms of diminutive suffixes, both for adjectives and substantives, are *-ŭlus*, *-ĭlus* (after *e*, *i*, or *v*), *-ellus* (the first l representing *l*, *n*, *r* of the original noun), and *cŭlus*. The gender follows that of the parent noun. Examples: *hortŭlus*, from *hortus* (M.), garden; *filiŏlus*, from *filius* (M.), son; *căpella*, from *căp(r)a* (F.), goat; *mūnuscŭlum*, from *mūnus* (N.), gift. *Adhibĭto*, comp. of *habeo*; *adhibeo*, pf. *-ŭī*. 5. *Nemo* (= *ne* + *hŏmo*) has acc. *nemĭnem*, dat. *nemĭnī*. For Gen. and Abl. the corresponding cases of *nullus* are used, *nullīus* and *nullō*.

Retranslation.—1. The farmers applied a great deal of manure to the field (ind. obj.). 2. But because the weather (*tempestāt-*) did not favour the radishes sown by the farmers, a scanty (*exĭguo-*) crop came up, which (F.) no one would buy on account-of (*ŏb* + acc.) (its) pale (*pallĭdo-*) colour (M.). 3. Accordingly, riding (*vecto-*) in a cart to the palace (tr. 'royal,' F., agreeing with *dŏmus*, house understood) he laid (*prōpōn-*) the matter before-the-king (what case?).

EXERCISE XXVIII.

1. Rex, hōc tam mīrō mūnĕrĕ laetŭs, agricolae multă mūnĕră donāvit, in hīs annŭlum sapphīro maximā ornātum. 2. Hīs audītīs, dives, quia hŏnōrī fratrīs invĭdēbat, sĭbī quŏquĕ majōres dīvĭtiās acquīrĕre vŏluit. 3. Mūnŭs ităque centum pĕcūdēs, ĕquōs vīginti cĭstellās aurī plenās fĕrentēs, ad rēgem mīsit 4. Haec ŭbī vĭdit, rex 'Munĕră tantă,' inquit,' nunquam ăb ūnō accĕpī. 5. Nihil est mihī in regiă tāntō dōnō dignum, nīsi răphānus illĕ ă frātrĕ tuŏ dātŭs; hunc, quaeso, accĭpĕ.'

Translation.—1. The king, delighted with this (so) wonderful gift, presented many gifts to the farmer, amongst them a ring ornamented with a very large sapphire. (See note on Gender, 2nd declension.) 2. On hearing this, the rich man, because he envied his brother's honour (Ex. xxvii. note 1), wished to gain greater wealth for himself also. 3. So he sent to the king a gift of (apposition) a hundred head of cattle, and twenty horses bearing pack-saddles full of gold. 4. On seeing these the king exclaimed, 'I have never received such large gifts from one man. 5. I have nothing in the palace worthy of such a great gift, except that radish given by your brother; this, I pray you, accept.'

Grammatical Notes.—3. *Centum — viginti*, what case? (See Ex. xxv. note 2.) The nom. from *pecŭd-*, F., a single 'head of cattle,' F., and *pecŏr-*, N., 'cattle' collectively, is the same, *pĕcūs*. 4. *Ubi -vidit*, lit., when he saw. 5. *Dignus* and its opposite, *indignus*, are constructed with Abl., like the Abl. of price. *Accipĭ*; verbs with short *ĭ*- stems belong to the consonant, not the long *ī* conjugation. They lose the *ĭ* before another I or a short ĕ. Hence from *fŭgĭ-*, flee; *căpĭ-*, take, &c., the infin. act. is *fŭg-ĕre*, *căp-ĕre*; 2 sing. imperat. *fug-ĕ*, *căp-ĕ*; 2 pl. pres. indic. act. *fug-ĭtis*, *cap-ĭtis* (not *fug-ītis*, like *aud-ītis*).

Retranslation.—1. One (Ex. xxvi. 3) farmer had a large number (*magnĭtūdĭn-*) of cattle. 2. The other (xxvi. 3) had obtained great favour with the king. 3. The richer farmer, when he saw that (for construction see Ex. xxiv. 2) his brother had obtained (pf.) favour with the king, sent a gift *of* a hundred and (omit 'and' in Latin) twenty head of cattle to the palace. 4. The king considered (*hăbĕ-* pf. *-ŭī*) him worthy *of* honour (note 5 above).

I- STEMS. (Third Declension continued.)

The case-endings are similar to those in the consonant stems; but, as in the other vowel declensions, -m (not -em) is added in the Acc. Sing., and the I is simply lengthened for Abl. Sing. In the Nom. and Acc. Pl. also, -s (not ēs) was originally added; but ēs, the commoner form in this declension, drove out -Is altogether from Nom. Pl. and partially in Acc. Pl. The neuter, adding no suffix for Nom. Acc. Sing., weakens the I to ĕ, or regularly drops the ĕ when ending in āli- or āri-.

1.	M. & F.	*tussi-*, F., cough.	Neuter.	*cūbīli-*, couch.	*ănīmāli-*, animal.
Sing.	N. V.	tussi-s	}	cūbile	ănīmăl
	Acc.	tussi-m			
	G.	tussi-s		cūbilis	ănīmālis
	D. Abl.	tussī		cūbilī	ănīmālī
Pl.	N. V.	tussēs	}	cūbīli-ă	ănīmāli-ă
	Acc.	tussīs or ēs			
	G.	tussi-um		cūbīli-um	ănīmāli-um
	D. Abl.	tussi-bus		cūbili-bus	ănīmāli-bus

Decline as *tussis*. *Sītis*, F., thirst, no pl.; *cucŭmĭs*, M., cucumber (also stem *cucumĕr-* as *cinis*); *vīs*, F. only in Acc. *vim*, Abl. *vī*, force, violence; pl. from stem *vīri-*, strength; and names of rivers as *Tĭbĕrĭs*, Tiber; but *Arar*, the Saone, and *Ligĕr*, the Loire, have ĕ also in Abl.

as *cŭbīle*. *Conclāvĕ*, N., chamber, and all other neuters in ĕ.

N.B.—Most names of towns, as *Praenestĕ*, and a mountain, *Sōractĕ*, of this class, form Abl. ĕ.

as *animal*. *Vectīgăl*, tax; *trĭbūnăl*, judgment-seat; *calcăr*, spur; *exemplăr*, pattern.

2. The case-endings of the more common consonant stems continually gained upon substantives with i- stems, while adjectives tended to adopt i- forms.

So we find we can subdivide i- stems (M. and F.), according to the predominance of *-em* and *ĭ* in Acc. and Abl. sing.

The first pure i- class contains very few examples; the second few; the third a fair number; the fourth, where *em* and *e* alone are found, the most. This second group has Acc. *im* or *em*, Abl. *i* or *e* indifferently.

3. Acc. em, Abl. ī or ĕ.

4. Acc. em, Abl. ĕ.

THE METRIC SYSTEM, AND HOW TO TEACH IT.

BY CHAS. BOWDEN.

THE method of working examples in weights and measures is precisely similar to the method adopted in working examples in money, and the rules need not here be repeated. In practice, however, a lesson should always be prefaced with oral questions on the principles, and an occasional simultaneous or individual repetition of the rules.

For example, if the lesson and exercises are to be on the Measure of Length such questions as the following should be asked:—What is the unit of length in the Metric System? How was it fixed upon? Compare a metre with an English yard. What name is given to 10 metres length? To 100? To 1000? To $\frac{1}{10}$th of a metre? To $\frac{1}{10,000}$th of a metre? Which is the longer, a kilometre or a mile? Compare them. How many kilometres would make five English miles? How many millimetres make a metre? (Putting down a number on the blackboard.) If this number represent centimetres read the value in decimetres; in metres; in dekametres.

Questions of a similar character should be given on the measures of surface, solidity, and capacity, and the table of weights.

WORKED EXAMPLES IN METRIC SYSTEM OF LENGTH.

1. What is the value of 15 kilom. 5 hectom. 3 m. in metres and centim.?

15 kilom. 5 hectom. 3 m.
= (15 × 1000) + (5 × 100) + 3 = 15503 m.

100 centim. = 1 m. ∴ 15503 m. = 1550300 centim.

2. How many kilometres in 3 million millimetres?

1000 millim. = 1 m. and 1000 m. = 1 kilom.
∴ 3,000,000 millim. ÷ (1000 × 1000)
= 3 kilom. Ans.

EXAMPLES FOR PRACTICE.

1. Express the following in metres and centimetres: (*a*) 7 kilom., 6 hectom., 3 dekam.; (*b*) 456 hectom.; (*c*) 395604 centim.; (*d*) 592687 decim.; (*e*) 59 hectom. 3 m. 9 centim.

2. In 39476857 millim. how many centim. decim., m., dekam., and kilom., respectively?

3. From 593 kilom. 3 m. take 396 kilom. 4 hectom. 3 millim.

4. Multiply 46 kilom. 3 m. 5 millim. by 7, 36, 91, and 500.

5. Divide 15683754 centim. by 95, and give the answer in metres and centim.

6. A man walked 18 kilom. 56 m. in 13 hrs.; how far would he have walked in 117 hours?

METRIC MEASURE OF SURFACE.

The unit for the measurement of surface is the *are*, which is a square dekametre, and therefore contains 100 sq. metres. This is equal to 119·6033 yards.

Compare this with an acre (4840 yds.).

To represent large surfaces by the *are* would necessitate large numbers, and it is therefore usual to express such surfaces in hectares, each containing 11960·33 yds., or nearly 2½ acres.

The following is the table:—

10 centiares = 1 deciare.
10 deciares = 1 are (the unit).
10 ares = 1 dekare.
10 dekares = 1 hectare.

To explain the formation of the table draw a square on the blackboard, as is the practice in explaining square measure. Divide each side into 10 parts, and by lines parallel to the sides subdivide the square into 100 smaller squares. The side will represent a dekametre, made up of 10 metres, the small squares will each represent a square metre, and the large square (containing 100 sq. metres) a square dekametre or are.

From the diagram show that

1 sq. metre = 1 metre × 1 metre, or
= 10 decim. × 10 decim.
= 100 sq. decim.

It also = 100 centim. × 100 centim.
= 10,000 sq, centim.

It also = 1000 millim. × 1000 millim.
= 1,000,000 sq. millim.

In the same way show that

1 sq. kilom. = 100 sq. hectom, or
10,000 sq. dekam. or
1,000.000 sq. m.

WORKED EXAMPLES IN MEASURE OF SURFACE.

1. How many centiares are there in 596 ares?

596 ares = 596 × 10 × 10 = 59,600 centiares.

2. Reduce 59,648 deciares to hectares.

59,648 deciar. = 59,648 ÷ 1000.
= 59 hectar. 648 deciar. or
= 59 hectar. 6 dekar. 4 are 8 deciar.

3. How many sq. metres are there in 7 hectares?

1 hect. = 100 ares.
100 ares = 100 × 100 = 10,000 sq. m.
7 hect. = 70,000 sq. m.

4. How many sq. centim. are there in a sq. kilom.?

1 sq. kilom. = 1,000,000 sq. m. (see above).
1 sq. m. = 100 × 100 = 10,000 centim. (see above).
∴ 1 sq. kilom. = 1,000,000 × 10,000.
= 10,000,000,000 centim.

Preface written work by oral questions as in measure of length.

EXAMPLES FOR PRACTICE.

1. What are the values of the following in ares, deciar. and centiar.? 7,649 centiar, 392 deciar, 42 dekar, 70,707 hectar.

2. Reduce 5 hectar, 7 dekar, 3 are to centiare?

3. Multiply 6 dekar. 7 are 5 deciar. 4 centiar. by 54, 100, 736.

4. Divide 49,126,785 centiar. by 5, 15, 73, 904, and give the answer in the various denominations of sq. measure.

5. Find the cost of 6 are 5 deciar. 8 centiar. of land at £64 per are.

6. How many times can a sq. metre be taken from a deciare? From an are? From a hectare?

An Elementary Course in the Use of Wood Working Tools.

BY FRED. WILKINSON, F.G.S.,

Science Teacher under the Bolton School Board.

A complete set of bits generally contains no less than twenty-four tools. This set consists of centre bits which have already been described. They vary in width from ¼ inch, and these often increase by 16ths to 1½ inches. In addition to the centre bit we have several bits such as are shown in fig. 135. These also vary in size from $\frac{1}{16}$ of an inch to ½ inch. Then we have what is known as a taper bit or scillop. This is shown in fig. 136.

Fig. 136.

There is also what is known as a countersink. The main use of this tool is to remove matter so as to allow, say, a screw-head to be made flush with the working surface. A screw can very often be made to do this without countersinking, but there is in finish of work a great difference when we do not countersink the hole preparatory to fixing in the screw. In fig. 137 we have an ordinary cast steel countersink. Sometimes this tool is used for countersinking brass.

Fig. 137.

It is applied exactly in the same way as the centre and shell bits, but is used after they have bored the hole for the screw or whatever may have to go in the hole.

Fig. 138 shows what is known technically as a 'square rinder.' This is an exceedingly useful tool in boring. All four sides are square and taper off to the end as shown in the figure.

Fig. 138.

Almost every set of bits will contain a drill. This is an indispensable tool to the artisan who works in wood. It is shown in fig. 139.

Fig. 139.

It not infrequently happens that the workman wishes to run in a number of screws more expediously, or it may be that the position for the hand screwdriver is not a favourable one. In either case he may apply to the brace a useful tool known as a 'turnscrew.' It is fixed in the brace as the other bits are. In fig. 140 we have a figure of a brace turnscrew.

Fig. 140.

How to hold the brace when working.—If we speak from a point of health we may be pardoned in saying that the common method usually seen in workshops is very bad. Not only is it bad but excessively fatiguing. We refer to the mode of placing the forehead upon the hand when in the act of boring.

It is best to maintain a rigid position, stand well up to the work and, placing the left hand firmly upon the head of the brace, use then ecessary pressure required to drive the bit into the wood, but be careful to maintain the tool in a vertical position. We will make this clearer by the use of a diagram.

Let us suppose we have two planes intersecting each other at AB, fig. 141, and forming in all four

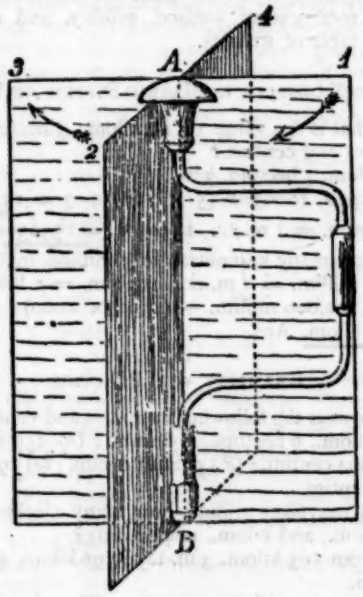

Fig. 141.

planes which are numbered respectively 1, 2, 3, and 4. The motion of the brace in boring is indicated by the two arrows. It is quite clear then in moving the handle through 90 degrees the plane in which the brace should be found at the ninetieth degree is that of No. 2. The sleeve and head will lie upon the axis or intersecting line of the two great planes as before. When the boring is proceeding, if the head and sleeve should leave this axis we may expect instead of a perpendicular boring one which is slightly oblique to the working surface. As we pass from half plane No. 2 to No. 3, we must retain perpendicularity of position and when the circle has been completed the end of it should find our brace in its original position as shown in the figure.

To prevent oblique boring when perpendicular boring is required, one of two methods is generally adopted.

1. We may turn the wood upon which we are working through half a circle and bore for a short time, then we may reverse, and so on, until the boring is completed.

2. If we do not care to turn the wood through 180 degrees, the position of the borer may changed. Let us suppose we are working on a bench and our faces are towards the head of the bench. When we have bored for a short time we may stand so that our face is now in front of the opposite end of the bench; in other words we have turned almost about.

Either of these methods will certainly help the pupil to bore a more perfect hole than if he attempt to do it without changing the wood or that of his position.

Exercise XXXIV.

A kite thread or string winder.

For the purpose of this exercise we shall require a piece of birch-wood $\frac{1}{4}$ in. when finished, $1\frac{1}{2}$ in. wide and greatest length $3\frac{1}{2}$ in. Select a piece of a little greater dimensions than those given here. We plane up two sides viz., the face side and face edge. Then we lay out our work on the planed up surface.

We first draw two lines parallel $1\frac{1}{2}$ in. wide. Draw the shorter line at the end and mark off $\frac{3}{4}$ in. on each end. Now take the brace and $\frac{3}{4}$ in. bit and bore through both ends as indicated in the fig. 142.

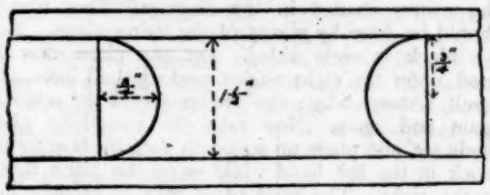

Fig. 142.

It is not wise to plane down to the right thickness, viz., $\frac{1}{4}$ in., until we have done the boring. It not infrequently happens that splintering takes place when we bore right through. Another and better way is to bore until the point of the bit is just through, then reverse the wood and continue the boring from the other side.

When the holes are successfully bored we may remove the matter outside the lines by the plane. Finish off the under side and we have then our model finished.

We show it in fig. 143.

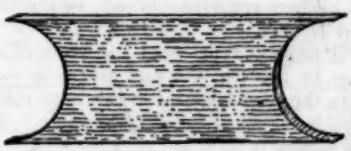

Fig. 143.

Exercise XXXV.

Stand for letters and papers.

We first obtain a suitable piece of wood sufficient for the three parts of the model,

Let the wood be oak. In the rough the block should be just under 2 ft. long 8 in. wide and a little over $\frac{1}{4}$ in. in thickness.

Plane up the surface perfectly true and also the face edge. Now lay out with set square ruler and compasses a similar drawing to what we see in fig. 144 (a). This is drawn one fourth of its proper size but the student will take the measurement as given in the figure.

Plane up next two strips 8 in. long and $\frac{1}{4}$ in. square. When the boring is accomplished these strips must be laid on the back in the position in fig. 144.

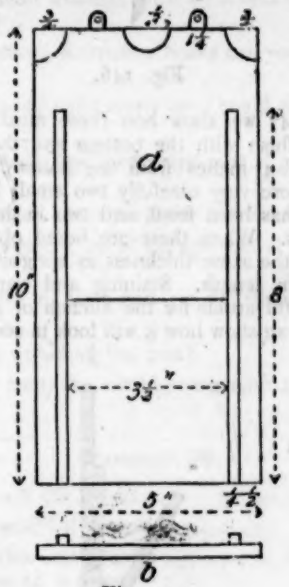

Fig. 144.

Having laid out this, a little above it lay out two figures like that we see in fig. 145.

Fig. 145.

These are to be placed in position to be described hereafter. When the three parts are completely laid out on the block prepared we must next take the boring. The pupil will see by careful reference to the figures that all necessary instructions are indicated. For example, take fig. 144. To obtain the right curves in this we take $1\frac{1}{2}$ in. bit, fit it in the brace and bore the two top curves. We can cut away unnecessary matter later on. Obtain the middle point of the top side, take the inch bit and cut out this curve. Now plane away the matter not required, shoot the ends, and this piece is now ready for the strips which should be placed in position by glueing. We proceed to finish off the smaller pieces, first the boring then the planing,

In fig. 146 we see the bottom part of the piece is planed at an angle. Set the bevel to an angle of 60° and then, having marked the side, shoot to this angle as described in exercise XIX, fig. 87.

Fig. 146.

In fig. 147 we show how these must be fixed—one piece flush with the bottom and the other at a distance of 4 inches from the bottom. To fasten these we bore very carefully two small holes in the rib, which has been fixed, and two in the lower end of the flaps. When these are bored obtain a piece of wire of the same thickness as sprigbit, and about one inch in length. Staining and varnishing will finish a useful article for the kitchen or sitting room. In fig. 147 we show how it will look in section.

Fig. 147.

Fig. 144b. shows the end section of the largest piece when the ribs have been fixed.

To hang up put two hangers behind in positions indicated.

Exercise XXXVI.

Towel Roller and Brackets.

We shall finish in this model our exercises on the brace and bit. Obtain suitable pieces of wood for the roller, pins, and rests. In this case we prefer to use birch or baywood. Deal would be too soft for purposes of the exercises.

Plane up a block to 2½ in. square and 18 in. long as shown in fig. 148.

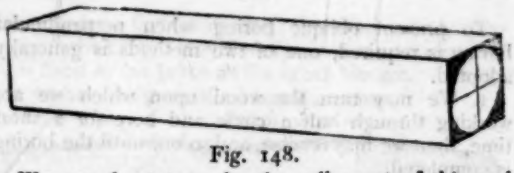

Fig. 148.

We are about to make the roller out of this and a glance at the end of figure 148 will show us the amount of matter which must be removed by the plane.

Now let us take up the block and draw the diagonals as shown in fig. 149. The intersection of

Fig. 149.

these will give us the centre. By the aid of scriber compasses or lead compasses we describe the circle as shown on both ends. The pupil must be careful to ensure that a perfect square exists at both ends. Unless he is careful to obtain these squares his work will not be true when roller is made. Where the diagonals cut the circumference of circle draw tangents and now proceed to fix the block upon the bench or in the vice, and by oblique planing remove the matter shaded in the diagram. This planing should be done by means of the trying plane. Now the block is eight sided. Let the plane now be used upon the eight angles, and we shall have as a result sixteen sides; the angles should be removed again and again. Now take the smoothing plane finely set, and plane up a smooth face by holding the block in the left hand while using the plane lightly in the right. The sand paper may be brought into requisition now until a perfectly rounded body is the result. It should have been observed that prior to rounding the ends should have been made perfectly square and true.

As we have the centre marks left in the end we do not find it difficult to make two holes 1½ in. deep by means of brace and bit, using the ½ in. bit. Remember here, in boring, remarks made upon position of body while boring. Great care should be exercised to obtain the holes perpendicular.

We now require two pegs to fit these, and we make them readily in the following way:

Obtain a block ½ in. square and 9 in. long. Round exactly in same way as roller by taking away all the corners. When rounded cut off two pieces 3½ in. long, and by means of glue fasten them in the hole. They will project 2 in. from the ends of the roller. We show in fig. 150 the end and side view of the roller with the pegs fastened in the large roller.

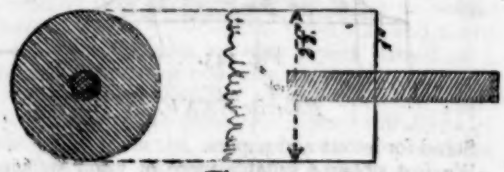

Fig 150.

The brackets now claim our attention. One piece of wood of sufficient length and width to lay out two of them is obtained. It should be planed up to one inch thick.

Lay out the work as shown in fig. 151 (b)

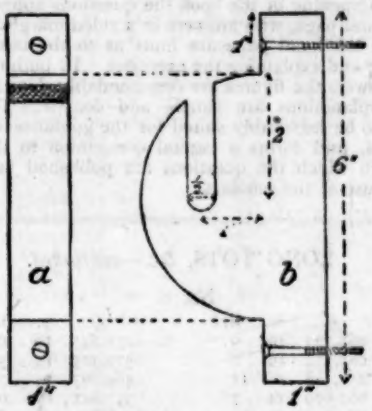

Fig. 151.

It should be observed the slot in the centre is obtained in the following way. When the large semi-circle has been got take the centre and measure one inch from it. This will give us the centre of a small semicircle of $\frac{1}{4}$ in. diameter, which falls below the radius shown in fig. 151 (b). By means of the frame saw cut out the brackets and use the chisel to finish off the edges. Bore the circle with $\frac{1}{2}$ in. bit and saw down the two lines and so get in the slot. Now bore by sprigbit two holes for screws. After counter-sinking them, the brackets, when sand papered, are ready for fixing on the wall or door or wherever it may be desired to put them.

In fig. 151 (a) we show front elevation of a bracket also.

CERTIFICATE EXAM.
(1st or 2nd Year.)
SCHOLARSHIP EXAM.

HIGHLY SUCCESSFUL COACHING BY CORRESPONDENCE.

No fees unless successful first time. Backward students *made* to pass. Exceptionally low terms. Addressed envelope for particulars, list of successes, &c., GEORGE HENRY SPARROW, Forest Gate, London, E.

N.B.—Teachers who intend taking Papers are invited to communicate at an early date with Mr. Sparrow. The work for these Exams. having been the speciality for the past eight years, with increasing success each year, there is little fear of failure now. Dull students are got through safely, and bright ones pushed into First Division.

The increasing demands of each year's Exam. should warn candidates to engage a Coach, making a *speciality* of his or her requirements.

Mrs. ORMISTON CHANT'S
"GOLDEN BOAT ACTION SONGS."
COMPOSED FOR HER CHILDREN.
FOURTH EDITION, 1s.

London: J. CURWEN & SONS, 8 & 9, Warwick Lane, E.C.

Tests in Mental Arithmetic.

STANDARD III.

1. If the quotient is 23 and the divisor is 40, what is the dividend? 920.
2. How many must you add to that number to make 50 score? 80.
3. What number of pence must be added to 2s. 10d. to make a crown? 26.
4. How many shillings must be added to £7 4s. to make £10? 56.
5. How many fourpenny books can you get for 9s. 8d.? 38.
6. How many eightpenny ones could you get? 19.
7. How much would two tons cost at 3s. a cwt.? £6.
8. How many stone are there in a ton? 160.
9. What would a ton of turnips cost at 2d. a stone? £1 6s. 8d.
10. If 7 lbs. of beef cost 5s. 3d., what is the cost per lb.? 9d.
11. What would $2\frac{1}{2}$ lbs. cost? 1s. $10\frac{1}{2}$d.
12. How many lbs. could you get for 13s. 6d.? 18.

STANDARD IV.

1. What will 360 books cost at 8d. each? £12.
2. What would they cost at 3d. each? £4 10s.
3. Find the cost of milk for a week, if 5 pints are used daily at 4d. a quart? 5s. 10d.
4. What will 9 gallons cost? 6s.
5. $\frac{1}{3}$ of a florin + $\frac{1}{4}$ of a shilling + $\frac{1}{8}$ of half-a-crown. 1s. 4d.
6. If half a cheese cost 7s. 6d., how much would 3 cheeses cost? £2 5s.
7. How many lbs. are there in $\frac{1}{4}$ of a ton? 448.
8. How many feet are there in $\frac{1}{10}$ of a mile? 528.
9. If a cap costs 1s. 8d., how many could you get for £50? 600.
10. How much would 37 cost? £3 1s. 8d.
11. If 3 horses cost £48, how much would 5 horses cost? £80.
12. I paid 9d. for some tea at 4s. a lb. How much did I get? 3 oz.

STANDARD V.

1. How many caps at 1s. 3d. can be bought for £13? 208.
2. How many could you get at 1s. 4d. each? 195.
3. If 8 men can eat 20 lbs. of beef in a week, how much could 6 men eat in the same time? 15 lbs.
4. How many men could eat 60 lbs. in a fortnight? 12.

5. Subtract $\frac{1}{8} + \frac{1}{4}$ from 1. $\frac{5}{8}$.

6. How many times can $\frac{5}{12}$ be taken from 10? 24.

7. What is the cost for 5 miles 4 fur. 20 po. at £20 a mile? £112 10s.

8. Find the value of 7 pecks 1 gal. 2 qts. at 2s. a peck. 15s. 6d.

9. What decimal of a ton is 15 cwt.? ·75.

10. What is 7 times that decimal? 5·25.

11. Find the amount of £450 in 3 years at 4 per cent. £504.

12. What would be the amount in 9 years? £612.

STANDARDS VI. AND VII.

1. Express the difference between $\frac{5}{6}$ and $\frac{3}{4}$ as a decimal. ·08$\dot{3}$

2. Take that decimal from unity. ·91$\dot{6}$.

3. What is a thousand times that decimal? 916·$\dot{6}$.

4. What is $\frac{3}{5}$ of $\frac{4}{7}$ of half-a-guinea? 4s. 6d.

5. If $\frac{1}{3}$ of a ton cost £5, what will $\frac{1}{4}$ of a ton cost? £3 15s.

6. What is the interest on £450 at £3 15s. per cent.? £16 17s. 6d.

7. Find the increase in income from an investment of £850, when the rate is changed from $3\frac{3}{4}$ per cent. to $5\frac{1}{4}$ per cent.? £12 15s.

8. If a thousand oranges are bought at 6d. a dozen and sold at 2 for $1\frac{1}{2}$d., what is the gain per cent.? 50 per cenl.

9. If sold at 8d. a dozen, what would be the gain per cent.? $33\frac{1}{3}$ per cent.

10. If articles be bought for £1 15s., at what price must they be sold to gain $8\frac{1}{3}$ per cent.? £1 17s. 11d.

11. What income will be derived from investing £380 in the 4 per cents. at 96? £15 16s. 8d.

12. How much must be invested in the same stock to have an income of a pound a week? £1,248.

—o—

Publications Reviewed.

The Holborn Practical Primer: Parts I. and II. The Holborn Practical Infant Reader: Parts I. and II. London: Educational Supply Association, Limited.

These little books are thoroughly worthy the name. By very gradual steps, beginning almost entirely with short vowels and the necessary consonants, the child is led into all the mysteries of English monosyllables by means of sensible little sentences and stories. After mastering the first primer, the first reader and second primer are so arranged as to be used alternately. The printing, illustrations and binding are all good, and if there is no royal road to learning, the stages are smoothed and made pleasant by these cleverly written little books.

The Teacher's Helpful Book of Mental Arithmetic. By Thomas W. Piper. London: George Philip and Son.

A numerous and varied assortment of questions in Arithmetic to be worked mentally is here presented arranged in exercises for the Standards of the code. At each opening of the book the questions appear on the right hand page, with answers in a ruled marginal space. On the left hand page are hints as to the best way of working and explaining the exercises. In both questions and answers the figures are commendably clear and bold. The explanations are simple and concise. The book seems to be admirably suited for the guidance of young teachers, and forms a capital companion to the small books in which the questions are published separately for the use of the scholars.

LONG TOTS, &c.—*continued.*

No. 8.

	£	s.	d.		£	s.	d.
1.	268,723	16	9	2.	231,843	16	9
	685,374	19	8		579,375	19	5
	257,548	18	11		484,897	14	7
	863,679	14	7		357,842	18	6
	984,765	17	5		438,679	16	8
	841,076	15	9		763,897	17	9
	364,735	18	6		847,568	10	8
	542,869	16	8		685,863	15	7
	976,342	13	4		347,598	17	9
	342,879	14	7		873,425	14	11
3.	247,842	16	8	4.	248,761	16	4
	428,285	18	9		182,675	14	11
	763,842	19	11		348,576	12	8
	275,284	14	7		842,756	18	9
	763,842	17	10		223,567	17	6
	238,629	18	5		842,768	16	4
	763,375	15	8		724,542	14	11
	842,137	13	4		249,685	16	8
	185,719	17	6		742,379	18	9
	958,875	19	5		427,738	19	4

No. 9.

	£	s.	d.		£	s.	d.
1.	422,168	18	5	2.	241,763	17	6
	245,376	15	9		367,484	18	9
	642,739	17	6		675,348	17	5
	561,973	16	8		437,692	15	7
	156,397	13	4		285,279	14	8
	98,739	19	11		763,482	18	6
	218,754	11	8		124,248	16	7
	432,375	18	10		432,879	19	4
	584,753	12	7		218,432	14	9
	210,114	17	5		763,475	9	11
3.	241,368	14	8	4.	248,763	15	9
	824,863	17	6		584,367	19	5
	143,386	16	9		213,478	17	6
	734,638	19	6		347,625	16	8
	148,763	15	7		765,248	12	5
	543,789	17	5		321,560	15	2
	125,375	14	8		845,678	17	11
	839,758	18	4		321,570	11	9
	84,389	17	8		632,758	19	10
	983,418	18	3		814,395	18	6

No. 10.

	£	s.	d.		£	s.	d.
1.	348,617	14	6	2.	213,469	14	11
	432,776	16	8		763,842	16	8
	238,534	19	7		375,898	18	9
	297,683	17	9		736,542	19	8
	842,769	18	5		148,763	13	6
	763,484	15	6		485,971	16	3
	241,769	16	8		143,219	19	10
	842,375	18	6		824,763	12	8
	248,583	13	4		375,367	18	5
	421,769	14	9		842,739	15	7

	£	s.	d.		£	s.	d.
3.	423,842	14	9	4.	763,842	14	11
	241,763	17	6		137,568	16	8
	358,376	16	8		876,386	17	9
	842,265	18	5		742,683	19	7
	245,652	15	7		425,874	18	5
	189,763	17	5		127,689	15	10
	254,187	13	11		976,342	17	9
	540,623	14	9		427,563	14	6
	879,362	16	10		480,579	13	8
	268,795	17	8		321,086	16	4

No. 11.

	£	s.	d.		£	s.	d.
1.	314,689	16	8	2.	243,124	14	9
	753,276	18	6		348,432	19	5
	482,725	19	5		127,385	16	3
	529,832	17	4		589,763	13	5
	375,484	14	7		895,376	14	9
	763,847	19	8		342,189	17	6
	639,742	18	11		435,378	13	4
	238,594	12	9		153,837	15	5
	127,389	19	2		69,184	17	9
	233,573	10	10		496,831	19	11
3.	342,189	16	9	4.	234,035	14	9
	423,897	17	8		124,763	17	3
	541,085	18	7		235,385	10	6
	69,408	15	4		742,839	19	11
	306,845	14	6		124,398	12	7
	545,689	16	5		342,109	17	5
	976,543	15	3		238,594	15	7
	347,986	18	11		374,906	17	9
	275,869	19	6		315,675	18	6
	572,385	10	5		589,763	16	8

No. 12.

	£	s.	d.		£	s.	d.
1.	146,732	16	8	2.	231,845	14	6
	264,237	14	6		589,763	16	8
	846,371	18	9		375,404	13	4
	264,482	19	5		753,846	18	9
	284,375	17	6		578,486	13	8
	573,759	15	7		324,837	12	11
	842,975	18	6		569,375	14	8
	632,484	16	8		846,738	11	10
	823,842	13	4		693,837	16	8
	675,384	14	6		328,763	19	9
3.	687,429	14	6	4.	248,763	14	6
	87,248	17	8		483,376	16	9
	639,763	18	11		397,763	18	10
	936,376	19	7		489,376	14	6
	843,736	17	9		987,375	17	9
	436,389	18	6		474,896	19	11
	843,375	14	7		389,763	14	6
	863,489	16	8		421,082	17	9
	695,373	15	3		631,289	19	7
	423,758	13	5		763,407	14	8

No. 13.

	£	s.	d.		£	s.	d.
1.	248,763	14	8	2.	246,735	19	7
	384,376	18	4		837,498	17	8
	482,739	12	11		783,849	18	6
	895,784	10	9		279,485	16	9
	484,375	19	10		897,854	19	11
	876,482	18	6		321,482	14	7
	752,834	16	8		134,824	17	5
	276,575	13	4		763,282	15	8
	843,286	14	6		124,823	16	10
	765,834	17	5		248,437	10	6
3.	243,829	18	9	4.	234,875	18	9
	764,287	19	7		148,657	19	11
	342,378	17	6		635,763	11	6
	763,484	14	9		428,376	16	10
	832,842	19	7		642,739	10	9
	678,763	18	5		824,375	19	8
	540,183	15	8		484,537	16	4
	769,435	14	7		214,673	14	9
	534,672	17	11		816,367	19	8
	243,267	19	8		264,138	18	7

No. 14.

	£	s.	d.		£	s.	d.
1.	241,836	17	9	2.	231,482	14	6
	148,439	18	11		289,763	16	9
	763,387	19	10		543,897	19	8
	429,763	14	6		284,978	18	4
	285,475	16	8		489,763	14	8
	235,578	18	11		398,367	18	11
	249,763	14	9		824,379	11	9
	367,849	19	10		248,793	19	7
	589,758	16	9		298,379	14	8
	235,462	19	6		842,125	18	10
3.	426,835	18	11	4.	389,742	14	11
	268,423	14	6		298,274	11	9
	297,563	16	8		123,742	19	8
	805,427	15	7		235,864	18	11
	587,635	17	5		124,486	14	6
	235,763	18	6		412,864	16	8
	428,674	16	9		125,763	18	9
	284,763	12	11		842,685	19	8
	425,376	14	6		564,763	14	7
	287,493	16	10		285,846	17	5

ANSWERS.

No. 1.

1. £5,625,039 16s. 9d.
2. £5,127,920 16s. 11d.
3. 5,181,807 2s. 11d.
4. 5,419,688 18s. 5d.

No. 2.

1. £4,955,484 1s. 8d.
2. £4,811,680 6s. 2d.
3. £4,310,798 4s. 6d.
4. £4,426,558 14s. 2d.

No. 3.

1. £5,128,186 15s.
2. £4,797,084 16s. 7d.
3. £4,606,443 7s. 1d.
4. £4,587,846 13s. 8d.

No. 4.

1. £4,791,040 16s. 5d.
2. £5,579,228 10s. 8d.
3. £5,183,109 10s. 8d.
4. £4,512,485 15s. 1d.

No. 5.

1. £4,504,755 14s.
2. £4,410,365 4s. 3d.
3. £4,948,471 4s. 3d.
4. £4,786,096 1s. 10d.

No. 6.

1. £5,451,227 19s. 11d.
2. £4,075,697 13s. 7d.
3. £5,478,274 5s. 5d.
4. £4,140,201 12s.

No. 7.

1. £5,391,059 9s. 9d.
2. £5,662,348 19s. 1d.
3. £5,214,514 1s. 11d.
4. £5,841,334 12s. 9d.

No. 8.

1. £6,127,998 6s. 2d.
2. £5,610,995 2s. 7d.
3. £5,467,838 12s. 1d.
4. £4,933,456 6s. 2d.

No. 9.

1. £3,573,396 2s. 1d.
2. £4,310,090 3s.
3. £4,669,755 10s. 4d.
4. £5,095,450 4s. 11d.

No. 10.

1. £4,678,367 5s. 8d.
2. £4,910,581 6s. 3d.
3. £4,244,636 3s. 6d.
4. £5,279,620 5s. 5d.

No. 11.

1. £4,459,159 17s. 10d.
2. £3,701,507 2s. 6d.
3. £4,401,904 3s. 4d.
4. £3,322,475 0s. 11d.

No. 12.

1. £5,354,649 5s. 5d.
2. £5,292,901 18s. 9d.
3. £6,476,944 6s. 10d.
4. £5,287,098 8s. 9d.

No. 13.

1. £6,011,055 16s. 11d.
2. £4,638,277 7s. 5d.
3. £5,723,148 16s. 5d.
4. £4,694,508 6s. 9d.

No. 14.

1. £3,547,318 17s. 5d.
2. £4,452,034 7s. 8d.
3. £4,047,965 12s. 7d.
4. £3,424,037 6s. 10d.

'YOU HAVE DONE A GREAT THING WHEN YOU HAVE BROUGHT A BOY TO HAVE ENTERTAINMENT FROM A BOOK.'—DR. JOHNSON.

Adopted by Leading School Boards.

DR. BEACH'S ENTERTAINING READERS

Recommended by H.M.I.

A B C Book Price 1d. | INFANTS' READER Price 4d. | STANDARD II. Price 9d.
PRIMER .. „ 2d. | STANDARD I. .. „ 8d. | STANDARD III. „ 1s.
STANDARD IV. .. .. Price 1s. 3d.

WHAT TEACHERS SAY.

Mr. L. Conway, Head Master Holy Cross Boys' School, Liverpool (average 822):—'I think they are excellent, and quite original, and have adopted them all.'

Mr. E. New, Head Master Southwick Board School, Sussex:—'I consider them to be the **BEST** I have seen during an experience of 44 years.'

Mr. P. Poynter, Head Master Board School, Ruarden:—'If I, a Head Master since 1858, may be allowed to judge, I should say Dr. Beach's Books for lower standards **are the best in the market.**'

The Head Master Wesleyan School, Ealing, London:—'Dr. Beach's Readers are the finest little books (Infants) of their kind I have ever seen.

Mrs. Rogers, Head Mistress Granby Road Board School, Manchester:—'Charmed with them,' (Infants' books).

Mr. Thos. C. Elliot, Head Master Springfield Boys' Board School, Sheffield:—'Dr. Beach's New Readers will, I am sure, be popular; they are both *original* and "Entertaining." We had demonstrative proof of the latter at home. I placed them in the hands of my children, and we had to use rather urgent language at "meal-time" to get them to lay them aside to have their food.'

Mr. Herbert Wills, Head Master Halliwell Road School, Bolton:—'I am charmed with your New Infant Readers.'

Mrs. Curphey, Head Mistress Beech Lane Schools, Macclesfield:—'Will make the Reading lessons longed-for by the children. I am having them throughout the school for the coming year.'

Mr. J. T. Titchener, Head Master Wesleyan School, Whitchurch:—'Certain to be great favourites with the scholars. They are very original and full of interest.'

Mr. G. H. Pitt, Head Master Ardsley Board School, Barnsley:—'I have seen Standard I. and am delighted with it; it is quite out of the ordinary run of Reading Books. If the others are equal to it, I shall never rest until I have a full set throughout the school.'

Mr. J. Porter, Head Master Manse Lacy School, Hereford:—'The books are novel, and are quite a new departure from the ordinary School Reader, and although full of fun and amusement, I find a vein of good instruction underlying all the stories, so that the books will not only amuse, but will help materially to sharpen the wits of the scholar. These books will be gratefully welcomed by all teachers into whose hands they may fall.'

Mr. F. Baxter, B.A., Head Master Boys' Board School, Bideford:—'My boys are enraptured by Dr. Beach's Entertaining Reader No. 2.'

Mr. Thos. W. Berry, Head Master Christ Church Schools, Stone, Staffs.:—'I like Dr. Beach's Readers very much indeed, and so do the children; this is a conclusive proof that they are "entertaining."'

Mr. T. Morgan, Priory Street Boys' National School, Carmarthen:—'Having heard so much about the excellency of Dr. Beach's Entertaining Readers, I shall be very pleased to receive specimens o. Standards I. and III.

The Head Mistress of a Large Infants' School (average upwards of 800):—'Will you kindly send me specimens of Dr. Beach's Entertaining Readers, which have been recommended to me by H.M.I.?'

The Head Master of a Certified Industrial Boys' School writes:—'A few days ago I was speaking to one of H.M.I.'s respecting Reading Books. He spoke very highly of Dr. Beach's Entertaining Readers.'

LONDON: JOSEPH HUGHES & Co., PILGRIM STREET, LUDGATE HILL, E.C.

PRINTED BY W. P. GRIFFITH & SONS (LIMITED), and PUBLISHED BY JOSEPH HUGHES & CO. FOR THE EDUCATIONAL MAGAZINE PUBLISHING COMPANY (LIMITED), AT 5, PILGRIM STREET, LUDGATE HILL, LONDON, E.C.